



SmartGen
ideas for power

HEM8400

ENGINE CAN MONITORING CONTROLLER

USER MANUAL



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3 SPECIFICATION











Table 2 Technical Parameters

Parameter	Details
Working Voltage	DC10. 0V to 35. 0V, uninterruptible power supply
Overall Consumption	<5W (Standby mode: ≤3.5W)
Start Relay Output	16A DC28V power supply output
ECU Power Relay Output	16A DC28V power supply output
Programmable Relay Output 1-2	7A DC28V power supply output
Case Dimension	247mm×191mm×71mm
Panel Cutout	214mm×160mm
Mounting Screw Dimension	Φ4
Working Conditions	Temperature: (-25~+70)°C Humidity: (20~93)%RH
Storage Conditions	Temperature:(-25~+70)°C
Protection Level	IP65
Weight	0.90kg
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal. The leakage current is not more than 3mA within 1min.

4 OPERATION

4.1 KEY FUNCTION DESCRIPTION

Table 3 Key Function Description





Icons	Keys	Description
	Stop	Stop the running generator; Reset shutdown alarms when engine alarms occur;
	Start	Start genset in standby status;
	Power	In standby status, press and hold this key to turn off the power; In power off status, press and hold this key to turn on the power;
Diag	Diagnosis	It can put the controller in diagnostic mode, and its indicator lights up; Press it again and it exits diagnostic mode, and its indicator lights off.
	Paging Up	In Diagnostic mode, if multiple ECU alarms occur, it can check the flashing status of the last alarm.
	Paging Down	In Diagnostic mode, if multiple ECU alarms occur, it can check the flashing status of the next alarm.
on/off	Hand Throttle Control	After the genset starts, it can put the genset in hand throttle mode, its indicator lights up, and speed can be adjusted on throttle knob. Press it again and the genset exits hand throttle mode, its indicator lights off, and speed cannot be adjusted at this moment.
	Zero Clearing	Press it for more than 3s and “subtotal time”, “subtotal fuel consumption” and “subtotal avg. fuel consumption” become “0”.
	Home/Set	In main menu page, it can enter parameter setting interface; in other pages, it can make it faster to return the main menu page.
	Up/Increase	1) Screen scroll; 2) Move up cursor and increase value in setting menu.
	Down/Decrease	1) Screen scroll; 2) Move down cursor and decrease value in setting menu.
	Throttle Knob	In hand throttle mode, forward/backward rotate this knob to increase/decrease target speed; Press the knob and it can return to 'Idle Speed'.

4.2 CONTROLLER PANEL



Fig. 1 Front Panel Indication

Table 4 Indicator Description

Indicators	Description
	Engine shutdown alarm indication, when diagnostic mode is active, if ECU alarms occur, users can check corresponding fault alarm information through flicker times of this indicator.(engine red light)
	Engine warning alarm indicate, when controller detects warning alarm signals, this indicator flashes.(engine yellow light)
	Engine waiting for start indication, when engine preheat starts, ECU initiates corresponding preheat command.
	Charging indication, after charging indication input accessing to the controller, when charge, it will light off, otherwise, it will light on.

6 PROTECTIONS

6.1 WARNING ALARMS

Warning alarms does not lead to shutdown, and corresponding warning alarm types are displayed on LCD. If controller detects more than one ECU alarms (if more than 5 pieces), LCD will display max 5 ECU alarms.

Table 10 Warning Alarms

No	Type	Description
1	Battery Over Volt	When the controller detects that the battery voltage has exceeded the pre-set value, it will initiate a warning alarm
2	Battery Under Volt	When the controller detects that the battery voltage has fallen below the pre-set value, it will initiate a warning alarm
3	Oil Filter Maintenance Due	When the running time is arrived at preset oil filter maintenance time, it will initiate a warning alarm.
4	Diesel Filter Maintenance Due	When the running time is arrived at preset filter maintenance time, it will initiate a warning alarm.
5	ECU Warning	When the controller received engine warning signals via J1939, it will initiate a warning alarm and fault code and name will be displayed.
6	Low Fuel Level	When the controller detects that the fuel level has fallen below the pre-set value, it will initiate a warning alarm.
7	Fuel Level Open Circuit	When the controller detects that the fuel level sensor open circuit, it will initiate a warning alarm.
8	Flexible Sensor 1-2 Open Circuit	After sensors are enabled, when controller detects corresponding sensor is open circuit. It will initiate a warning alarm.
9	Flexible Sensor 1-2 High	After sensors are enabled, When the controller detects that the sensor value has exceeded the pre-set upper limit value, it will initiate a warning alarm.
10	Flexible Sensor 1-2 Low	After sensors are enabled, When the controller detects that the sensor 1 value has fallen below the pre-set lower limit value, it will initiate a warning alarm.
11	Input 1-5 Warning	When digit input port is set as warning and the alarm is active, it will initiate a warning alarm.
12	Empty Filter Block	When empty filter block input is active, it will initiate a warning alarm.
13	Low Water Level	When low water level input is active, it will initiate a warning alarm.
14	Failed to Start	If the number of controller start attempts exceeds pre-set start times, it will initiate a warning alarm.

6.2 SHUTDOWN ALARMS

When controller detects shutdown alarms, detailed alarms information will be displayed on LCD alarm page.

▲NOTE: When controller detects shutdown alarms, only display shutdown alarm information but not to control ECU shutdown, users need to press “Stop” key to shutdown ECU.

Table 11 Shutdown Alarms

No	Type	Description
1	ECU Shutdown	When the controller received engine warning signals via J1939, it will initiate a warning alarm and fault code and name will be displayed.
2	ECU Communicate Fail	When the engine start up but controller didn't via J1939 receive engine warning signals, it will initiate a warning alarm.
3	Flexible Sensor 1-2 High	After sensors are enabled, When the controller detects that the sensor value has exceeded the pre-set upper limit value, it will initiate a warning alarm.
4	Flexible Sensor 1-2 Low	After sensors are enabled, When the controller detects that the sensor 1 value has fallen below the pre-set lower limit value, it will initiate a warning alarm.
5	Input 1-5 Shutdown	When digital input port is configured as “shutdown” and after it is active, it will initiate a warning alarm.

7 WIRING CONNECTION

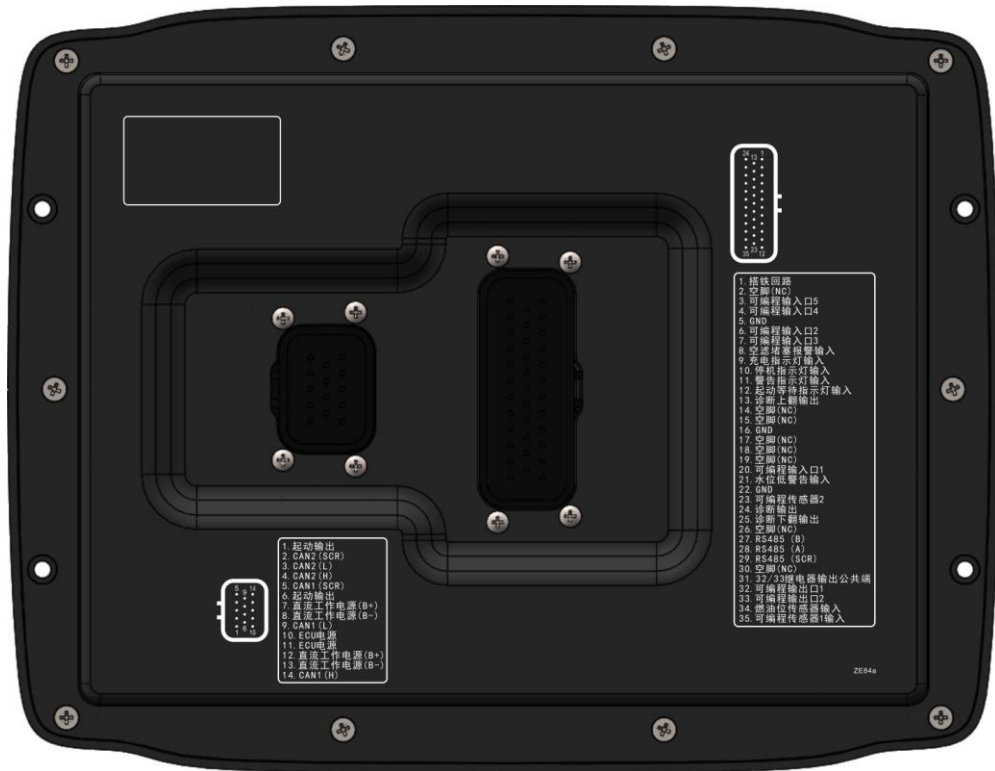


Fig. 4 Controller Back Panel

Table 12 Terminal Wiring Description

No.	Functions	Cable Size	Remark
A Plug Terminal (Back Penal)			
1	Ground Loop	1.0mm ²	ECU ground loop
2	NC	1.0mm ²	NC
3	Programmable Input 5	1.0mm ²	Discrete input port
4	Programmable Input 4	1.0mm ²	Discrete input port
5	GND	1.0mm ²	GND
6	Programmable Input 2	1.0mm ²	Discrete input port
7	Programmable Input 3	1.0mm ²	Discrete input port
8	Empty Filter Block	1.0mm ²	Empty filter block alarm input
9	Charging Indicator Input	1.0mm ²	Discrete input port
10	Shutdown Indicator Input (red light)	1.0mm ²	Discrete input port
11	Warning Indicator Input (yellow light)	1.0mm ²	Discrete input port
12	Waiting for start Indicator Input	1.0mm ²	Discrete input port
13	Diagnosis Paging Up Input	1.0mm ²	Output port control, the max contact capacity is 7A
14	NC	1.0mm ²	NC
15	NC	1.0mm ²	NC
16	GND	1.0mm ²	GND
17	NC	1.0mm ²	NC
18	NC	1.0mm ²	NC
19	NC	1.0mm ²	NC
20	Programmable Input 1	1.0mm ²	Discrete input port
21	Low Water Level Warning	1.0mm ²	Low water level input port
22	GND	1.0mm ²	GND
23	Flexible Sensor 2	1.0mm ²	Analog input port
24	Diagnosis output	1.0mm ²	Output after diagnosis is active
25	Diagnosis Paging Down	1.0mm ²	Diagnosis paging down output
26	NC	1.0mm ²	NC
27	RS485 (B)	1.0mm ²	RS485 (B)

No.	Functions	Cable Size	Remark
28	RS485 (A)	1.0mm ²	RS485 (A)
29	RS485 (SCR)	1.0mm ²	RS485 (SCR)
30	NC	1.0mm ²	NC
31	32/33 Relay Output COM	1.0mm ²	32/33 relay output common port
32	Programmable Output 1	1.0mm ²	Output port control, the max contact capacity is 7A
33	Programmable Output 2	1.0mm ²	Output port control, the max contact capacity is 7A
34	Fuel Level Sensor Input	1.0mm ²	Analog input port
35	Flexible Sensor 1	1.0mm ²	Analog input port
B Plug Terminal (Back Panel)			
1	Start Output	2.5mm ²	Connecting with start output capacity 16A
2	CAN2(SCR)	1.0mm ²	Standby CANBUS
3	CAN2(L)	1.0mm ²	Standby CANBUS
4	CAN2(H)	1.0mm ²	Standby CANBUS
5	CAN1(SCR)	1.0mm ²	Engine J1939 CANBUS
6	Start Output	2.5mm ²	Connecting with start output capacity 16A
7	B+	2.5mm ²	Working power supply DC B+
8	B-	2.5mm ²	Working power supply DC B-
9	CAN1(L)	1.0mm ²	Engine J1939 CANBUS
10	ECU Power Supply	2.5mm ²	Connecting with ECU power output capacity 16A
11	ECU Power Supply	2.5mm ²	Connecting with ECU power output capacity 16A
12	B+	2.5mm ²	Working power supply DC B+
13	B-	2.5mm ²	Working power supply DC B-
14	CAN1(H)	1.0mm ²	Engine J1939 CANBUS

9 SENSORS SETTING

- When reselect sensors, the sensor curve will be transferred into the standard value. For example, if temperature sensor is SGX (120°C resistor type), its sensor curve is SGX (120°C resistor type); if select the SGD (120°C resistor type), the temperature sensor curve is SGD curve.
- When there is difference between standard sensor curves and using sensor, user can adjust it in “curve type” and input target curvilinear coordinate.
- When input the sensor curve, X value (resistor) must be input from small to large, otherwise, mistake occurs.
- The headmost or backmost values in the vertical coordinates can be set as same as below,

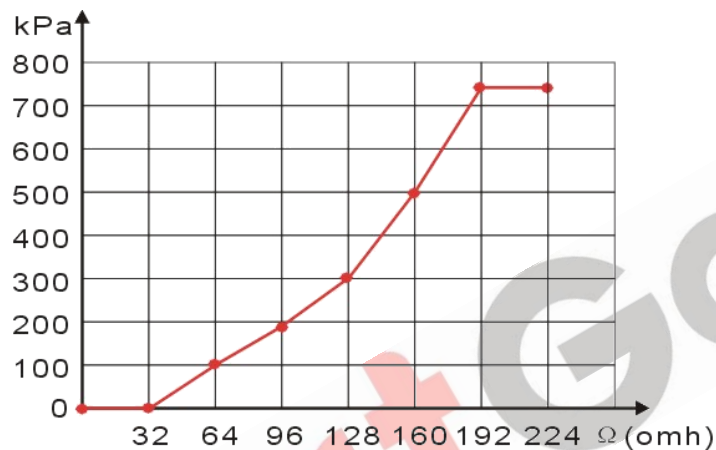


Fig. 5 Oil Pressure Sensor Curve

Table 19 Normal Pressure Unit Conversion Form

	N/m ² pa	kgf/cm ²	bar	psi
1Pa	1	1.02x10 ⁻⁵	1x10 ⁻⁵	1.45x10 ⁻⁴
1kgf/cm ²	9.8x10 ⁴	1	0.98	14.2
1bar	1x10 ⁵	1.02	1	14.5
1psi	6.89x10 ³	7.03x10 ⁻²	6.89x10 ⁻²	1

10 TYPICAL APPLICATION

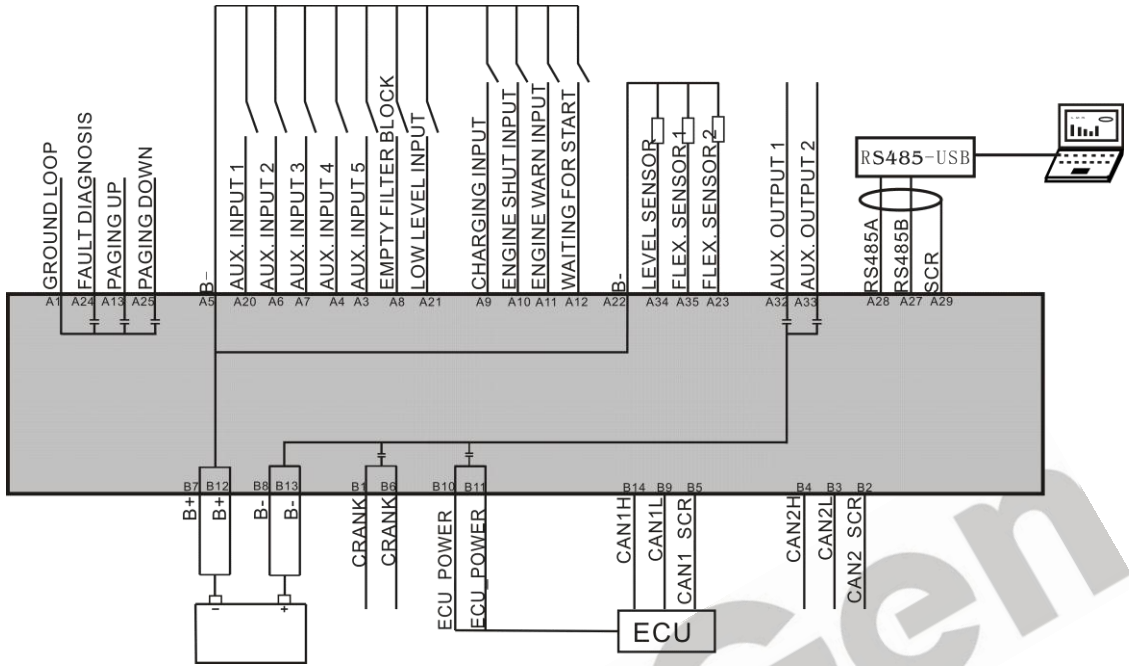


Fig. 6 HEM8400 Typical Diagram

11 INSTALLATION

11.1 FIXING CLIPS

The module is held into the panel fascia using the supplied fixing clips.

- Withdraw the fixing clip screw (turn anticlockwise) until it reaches proper position.
- Use 4 pieces $\Phi 4$ screws and nuts fixed on the 4 corresponding screw holes.
- Care should be taken not to over tighten the screws of fixing clips.

11.2 OVERALL DIMENSION AND PANEL CUTOUT

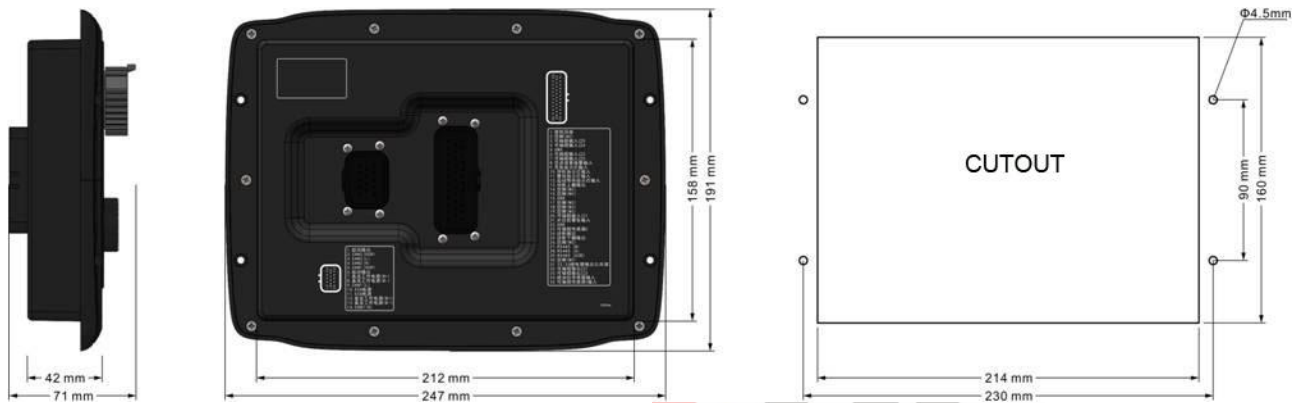


Fig. 7 Overall Dimension and Panel Cutout

HEM8400 controller can suit for widely range of battery voltage DC (10~35) V. Negative of battery must be connected with the shell of starter stable. The wire's diameter must be over 2.5mm^2 and which is connected to B+ and B- of controller power. If floating charge configured, please firstly connect output wires of charger to battery's positive and negative directly, then, connect wires from battery's positive and negative to controller's positive and negative input ports in order to prevent charge disturbing the controller's normal working.

a) **Output And Expand Relays**

All outputs of controller are relay contact output type. If need to expand the relays, please add freewheel diode to both ends of expand relay's coils (when coils of relay has DC current) or, increase resistance-capacitance return circuit (when coils of relay has AC current), in order to prevent disturbance to controller or others equipment.

b) **Withstand Voltage Test**

When controller had been installed in control panel, if need the high voltage test, please disconnect controller's all terminal connections, in order to prevent high voltage into controller and damage it.

12 FAULT FINDING

Table 20 Fault Finding

Symptoms	Possible Solutions
Controller no response with power.	Check starting batteries; Check controller connection wirings; Check DC fuse.
Shutdown Alarm in running	Check related switch and its connections according to the information on LCD; Check programmable inputs.
Fail to Start	Check fuel oil circuit and its connections; Check starting batteries; Check speed sensor and its connections; Refer to engine manual.
Starter no response	Check starter connections; Check starting batteries.

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